REMARKS

Claims 13-20 and 22-28 are currently pending. Claims 19, 22 and 25 are amended herein and new claims 26-28 are added herein. Claims 19, 22 and 25 have been amended to place them in independent form. Claims 1-12 and 21 are canceled herein without prejudice.

Applicants' Response to Objection to Title

The Office Action requires submission of a new title, because the title is too long. In response thereto applicants have amended the title to:

COATING LIQUID FOR FORMING TRANSPARENT COATING LAYER AND COATING LIQUID FOR FORMING TRANSPARENT CONDUCTIVE LAYER

Applicants' Response to the Claim Rejections under 35 USC §112

Claims 19, 22 and 25 stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter.

Specifically independent claims 13 and 16 use closed language "consisting of", and a dependent claim which adds a new element cannot be affixed. Hence, claims 19, 22 and 25 have been restructured to be in independent form. Applicants respectfully submit the rejection is no longer applicable.

Explanation of the Present Invention

The presently claimed invention is generally directed to a transparent conductive layered structure made up of a transparent substrate, a transparent conductive layer, and a

transparent coating layer, the transparent conductive layer and the transparent coating layer being formed successively in this order on the transparent substrate. This layered structure is designed for application, for example, to front plates for CRT and the like. More particularly, the present invention is directed to "a coating liquid for forming a transparent coating layer" and "a coating liquid for forming a transparent conductive layer," both of which are used for the production of such a transparent conductive layered structure.

The present invention has been accomplished in an effort to eliminate the problems to be discussed below. Namely, it has been conventional practice to use gold microparticles or gold-containing noble metal microparticles as conductive components for the above-mentioned transparent conductive layer. This is because, in the case where metal microparticles such as iron, nickel, cobalt, or the like are used in place of the above-mentioned gold microparticles and the like, an oxide film necessarily forms on the surfaces of these metal microparticles in an ambient atmosphere, resulting in the failure to obtain good conductivity required in the transparent conductive layer. In addition, when silver microparticles are used instead of the above-mentioned gold microparticles and the like, a problem with weather resistance has arisen which results from a marked tendency toward sulfurization, oxidation or degradation by brine, ultraviolet rays or the like (*see* page 6, line 3 to page 7, line 11 of the specification).

However, since gold is chemically inert, there has been a problem in that as to a transparent conductive layer formed using a coating liquid for forming a transparent conductive layer, which contains the above-mentioned gold microparticles or gold-containng noble metal microparticles, it is difficult to strengthen the bonding between

such gold microparticles or gold containing noble metal microparticles and a binder matrix such as silicon oxide or the like. Hence, the resultant transparent conductive layer is not sufficient in respect of film strength and weather resistance (*see* page 8, line 17 to page 9, line 5 of the specification).

The present invention has therefore focused its attention on the fact that a relatively strong bonding can be formed between gold and a functional group such as a mercapto group (–SH), a sulfide group (–S–), a polysulfide group ($-S_2-$, $X \geq 2$) or the like. This invention has resolved the above-noted problem by using, as a binder matrix for a transparent conductive layer, a binder matrix containing such a functional group.

More specifically, with the use of a binder matrix containing the above functional group in the transparent conductive layer, the gold microparticles or gold-containing noble metal microparticles bond to the functional group, strengthening the bonding at the interface between the gold microparticles or gold-containing noble metal microparticles and the binder matrix. Thus, it is possible to markedly improve the film strength, weather resistance and the like in the transparent conductive layer (*see* page 14, lines 9 to the last line of the specification).

The present invention incorporates "a functional group-containing compound having at least one functional group selected from mercapto groups, sulfide groups and polysulfide groups" into at least one of the coating liquid for forming a transparent coating layer and the coating liquid for forming a transparent conductive layer, thereby forming a binder matrix containing the functional group. Claim 13 recites that the functional group-containing compound is mixed in the coating liquid for forming a

transparent coating layer, whereas claim 16 recites that the functional group-containing compound is mixed in the coating liquid for forming a transparent conductive layer.

Applicants' Response to the Claim Rejections under 35 USC §102

Claims 13-15 and 25 stand rejected under 35 USC 102(b) as being anticipated by ***Engle et al.*** (USP 5,888,290). Applicants respectfully traverse on the grounds that the cited reference does not disclose the limitations of the presently claimed invention.

Engle et al. pertains to a composition and a process for imparting water and oil repellency, and stain and soil resistance to substrates such as carpets, textiles, paper and leather (*see* column 1, lines 13-16).

Claim 1 of ***Engle et al.*** recites "a fluorochemical treatment composition comprising a sol comprising a colloidal dispersion of polymer-grafted inorganic microparticles in liquid, and a fluorochemical."

Here, an isopropanol dispersion described in Example 42 of ***Engle et al.*** and including a colloidal silica suspension in isopropanol and mercaptopropyltri-methoxysilane is merely a composition used as a precursor for obtaining the "polymer-grafted inorganic microparticles" which constitutes part of the fluorochemical treatment composition mentioned above.

Namely, this precursor composition is merely a suspension of colloidal silica, the surface of which has been modified with mercaptopropyltrimethoxysilane. The suspension is mixed with a methacrylic acid monomer, followed by reaction of the mixture, whereby the "polymer-grafted inorganic microparticles" are prepared as one

component of the above-mentioned fluorochemical treatment composition (*see* column 12, line 47 *et seq.*, column 13, line 40 *et seq.*).

Hence, the fluorochemical treatment composition described by the reference cannot perform its function by using only the precursor composition (suspension of colloidal silica, the surface of which has been modified by reaction of silica sol and a coupling agent). In order to constitute the fluorochemical treatment composition of Engle et al., other components need to be added which include a methacrylic acid monomer, a fluorine-containing compound (Fluorad™) and the like.

In other words, the above-mentioned composition for use as a precursor cited by the Office Action is merely one of the components required in the fluorochemical treatment composition of Engle et al. This precursor composition is added on condition that other components are further added in which are included a methacrylic acid monomer, a fluorine-containing compound and the like.

In contrast, as recited in claim 13 of the present application, the coating liquid for forming a transparent coating layer consists of a solvent, an inorganic binder, and a functional group-containing compound. This coating liquid performs its function to form a transparent coating layer without the need for addition of other components.

And the coating liquid for forming a transparent coating layer according to claim 13 is coated over a corresponding layer preformed by the use of a coating liquid for forming a transparent conductive layer that contains gold microparticles or gold-containing noble metal microparticles. Upon over-coating, the coating liquid for forming a transparent coating layer comes into chemical action with the layer containing the gold microparticles or gold-containing noble metal microparticles, thus imparting significant

advantages such as improved conductivity, improved film strength, more improved weather resistance and the like, all at once, to the resultant transparent conductive layer (*see* page 21, line 3 to page 22, line 2 of the specification).

Even though ***Engle et al.*** describes the above-mentioned precursor composition preconditioned to be mixed with a methacrylic acid monomer and a fluorine-containing compound. As set forth above, ***Engle et al.*** does not disclose the limitations of current claim 13. Hence favorable reconsideration is requested.

Applicants' Response to the Claim Rejections under 35 USC §103

Claims 16-20, 23 and 24 stand rejected under 35 USC 103(a) as being unpatentable over JP 11-203943 to ***Yukinobu*** in view of WO 99-01766 to ***Buining*** and JP 09-286936 to ***Tofuku***. Applicants respectfully submit that the closed language of the claim renders the exact composition unobvious just as the exact composition was not anticipated above.

As discussed above, when gold microparticles or gold-containing noble metal microparticles are used as conductive components in a transparent conductive layer, it is difficult to obtain a strong bonding between the gold microparticles or gold-containing noble metal microparticles and a binder matrix such as silicon oxide or the like. Hence, the resulting transparent conductive layer is insufficient with regard to film strength and weather resistance. The present invention intends to eliminate these problems.

The coating liquid for forming a transparent conductive layer according to claim 16 of the present application consists of a solvent, gold microparticles or gold-containing noble metal microparticles containing 5 wt% or more of gold with a mean particle

diameter of 1 to 100 nm, dispersed in the solvent, and a functional group-containing compound having at least one functional group selected from mercapto groups (–SH), sulfide groups (–S–), and polysulfide groups ($–S_X–$, $X \geq 2$).

This coating liquid for forming a transparent conductive layer is coated over a transparent substrate, where needed, followed by drying. Over this coat, the coating liquid for forming a transparent conductive layer is coated which contains an inorganic binder such as silica sol or the like and a solvent. Thus, such a silica sol solution that has been over-coated seeps into the holes in the network structure of the gold microparticles or gold-containing noble metal microparticles that has been preformed by using the coating liquid for forming a transparent conductive layer. The silica sol solution on heat treatment becomes a binder matrix that contains as its main component silicon oxide and that includes at least one functional group selected from mercapto groups (–SH), sulfide groups (–S–), and polysulfide groups ($–S_X–$, $X \geq 2$). In the end, this binder matrix firmly bonds to the substrate and to the gold microparticles or gold-containing noble metal microparticles, with the result that improvement of conductivity, improvement of film strength, and even further improvement of weather resistance are simultaneously accomplished.

Applicants respectfully submit none of the cited references describe the above-noted problems addressed by the present invention.

In ***Buining et al.***, "a metal particle composed of a metal core and a silane shell" is described (*see* the Abstract and claim 1).

However, the metals useful in ***Buining et al.*** are different from the "gold microparticles or gold-containing noble metal microparticles" according to the present

invention, but are "gold, silver, platinum, palladium, rhodium, osmium and iridium, and mixtures thereof." In addition to gold alone or gold-containing noble metal, the metals of the reference include silver, palladium, rhodium, osmium and iridium.

Therefore, when the present invention is compared with the invention of ***Buining et al.***, nowhere does this reference describe a unique composition resulting from combining "gold microparticles or gold-containing noble metal microparticles" with "functional group-containing compound having at least one function group selected from mercapto groups (–SH), sulfide groups (–S–), and polysulfide groups ($–S_2–$, $X \geq 2$)." Understandably, Buining et al. does not teach or suggest the above-mentioned significant advantages that can be achieved only by combining the "gold microparticles or gold-containing noble metal microparticles" with the functional group-containing compound.

In addition, applicants respectfully submit that ***Tofuku*** does not disclose the limitations of claim 16 as set forth. Specifically, according to the coating liquid for forming a transparent conductive layer set forth in claim 16, the ratio of gold to be added to the "gold-containing noble metal microparticles" is set to be more than 5 wt%.

However, paragraph 0022 of ***Tofuku*** describes that the ratio of conductive microparticles to be mixed in the coating liquid for forming a transparent conductive layer can be set within the range from 0.1 wt% to 10 wt%. Applicants note that this ratio is not a ratio of gold to be added to the gold-containing noble metal microparticles.

As discussed above, the references fail to recognize the above-noted problems that the present invention has successfully eliminated. Nor do such references teach or suggest that the "gold microparticles or gold-containing noble metal microparticles" can be combined with the "functional group-containing compound having at least one

selected from mercapto groups, sulfide groups and polysulfide groups." These references do not in any way recognize the significant advantages of the present invention, which arise from combination of the "gold microparticles or gold-containing noble metal microparticles" and the "functional group-containing compound," that is the marked improvements in film strength, weather resistance and the like in the transparent conductive layer, which arise from the combination of the "gold microparticles or gold-containing noble metal microparticles" and the "functional group-containing compound having at least one selected from mercapto groups, sulfide groups, and polysulfide groups," this combination enabling a firm bonding to be formed between gold microparticles or gold-containing noble metal microparticles and a binder matrix.

Because none of the references teach or suggest the above-noted problems underlying the present invention, nor any other basis for combining to form the presently claimed invention, there is no justification, from technological viewpoints, that a person skilled in the art would have been motivated to combine these references. Accordingly, the Applicants respectfully submit that the claimed invention is not obvious over the cited references if taken in combination.

For at least the foregoing reasons, it is believed that this application is now in condition for allowance. If, for any reason, it is believed that this application is not in condition for allowance, Examiner is encouraged to contact the Applicants' undersigned attorney at the telephone number below to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 50-2866.

Respectfully submitted,

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